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(AGRI.-OGDEN)

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STATEMENT OF PURPOSE

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This publication is printed primarily to inform professional range administrators of important range improvement and management developments and findings. These "Notes" may include extracts of published papers, unpublished preliminary reports of research work, unpublished reports on administrative studies, and personal observations or suggestions of other range administrators. No claim is made as to the accuracy or completeness of studies or conclusions drawn.

All who read these RANGE IMPROVEMENT NOTES are encouraged to submit material for publication, or suggestions for improving its usefulness. Full credit will be given for any material used.

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SOIL-MOISTURE RETENTION AND SNOW-HOLDING CAPACITY AS AFFECTED BY THE CHEMICAL CONTROL OF BIG SAGEBRUSH
(Artemisia tridentata Nutt.)

By Leslie W. Sonder and Harold P. Alley *

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Control of big sagebrush (Artemisia tridentata Nutt.) with fire, chemicals, or mechanical means has long been recognized as an effective method for rangeland improvement. If this sagebrush is killed or weakened by some method of control, excellent stands of grass may be obtained if all conditions are favorable.

Blaisdell writes that knowledge of the effects of competition between sagebrush and native grasses is one of the basic requirements for an adequate study of the areas dominated by big sagebrush. The available moisture in soil is the most important factor in western range-forage production.

Robertson writes that even though sagebrush spreads and disperses a large amount of rain and snow, the competition for soil moisture is believed to be more important.

The amount of evaporation lost is relative to the quantity of precipitation intercepted; it varies with the kind of vegetation and the type and size of storm. Measurements show that interception loss is usually between 5 and 15 percent of the annual rainfall and is found to be fairly constant, under the same vegetative conditions, at various locations. Thinning or changing the vegetation so as to reduce the total volume of the canopy will reduce the water loss due to interception. Additional water may be delivered to the ground without damaging consequences, if the changing of the canopy does not seriously lower the protection provided to the soil by the vegetation.

Hyder and Sneva in reporting results of chemical control of sagebrush in Oregon three years after treatment, state that highest grass yields were obtained the first year after treatment, and yields decreased a

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little in each of the next two years. The response from sagebrush control may also be a release from competition for soil nitrogen as well as soil moisture. Experimental results also showed that on sagebrush-bunchgrass range there is an evident change in competition at different soil-moisture levels the first year after treatment. They concluded that the sprayed areas also improved the moisture relations by better retention of precipitation, but that moisture depletion was faster on the treated than on untreated areas.

In a study by Robertson concerning the degrees of competition between range grasses and sagebrush, it was noted that the sagebrush plant acts as a "black body" radiator and evidently hastens melting and evaporation of snow. This increased rate of snowmelt is apparently responsible for the fact that the grasses in his sagebrush areas started their spring growth two weeks earlier than the same species in cleared areas or in strips in which the brush has been sprayed.

Sagebrush intercepts and holds snow increasing the total surface area of the snow. Snow is released from the vegetation by wind or melt. There is often an abundant evidence of both; either drifts form or the snow is pitted beneath the brush from water droplets. The melting of snow from shrubby vegetation just before freezing weather may result in the formation of a layer of ice on top of the soil. Forsling states that a layer of ice on the surface of the soil will increase the runoff from the area.

Storey writes that a cover of vegetation and snow has a large influence upon the extent, the persistence, and the movement of frost into the soil. A light, new snow provides an insulation which tends to retard soil freezing. A 24-inch layer of snow will prevent frost penetration in severe weather. Even though the ground was frozen before the first snowfall, when snow depth reaches 18 to 24 inches, further freezing ceases.

Studies by Forsling show that there is often no frost in the soil when the ground has been continually blanketed during freezing periods. When the soil contains only a shallow frost it may thaw under a blanket of snow and absorb water as melting takes place. This study was undertaken to determine any differences in the soil-moisture percentage at various soil depths between controlled and uncontrolled sagebrush areas, and to determine the effect of sagebrush control on the snow-holding capacity of the areas.

Results

Red Desert Soil-moisture Studies

Soil-moisture studies made one year after initial chemical treatment indicate that areas of 80 to 100 percent sagebrush control retain more soil moisture than do the untreated areas. The chemically controlled areas retained a significantly higher percentage of moisture at the 6-7, 12-13, and 18-19-inch soil depths than the noncontrolled areas. The largest difference in moisture was found to occur at the depth of 18-19 inches.

Data show that at the 18-19-inch soil depth there was a difference of 3 percent soil moisture between the controlled and uncontrolled sagebrush areas during the summer of 1958; therefore, the controlled area actually contained 63.8 percent more soil moisture than the uncontrolled area. The greatest moisture difference was observed at the sampling date in July, with an average difference of 3.1 percent at the 6-7-inch depth, 2.4 at the 12-13-inch depth, and 4.3 percent at the 18-19-inch level, with the controlled area containing the higher percentage of soil moisture.

The chemically controlled sagebrush plots exhibited a sharp drop in soil moisture from July 20 to August 21 with a slight increase in moisture content from August 21 to September 28; however, the live-sagebrush areas exhibited a steady decline in moisture percentage from July through September. A significantly higher amount of moisture was found in the controlled areas on July 20 and September 28, with the percentage of moisture approximately the same on August 21 for the two areas.

In June and July 1959, two years after treatment, a significantly higher percentage of soil moisture was found at the 12-13-inch and the 18-19-inch depth in the controlled area when compared with that of the uncontrolled sagebrush area. The controlled area contained 26.6 percent more soil moisture at the 12-13-inch depth and 34.7 percent more soil moisture at the 18-19-inch depth than the uncontrolled sagebrush area on June 8, with no appreciable difference noted at any depth in July.

In June and July of 1959, there was a significant difference of 3.3 atmospheres in soil-moisture tension between the controlled and uncontrolled areas. The controlled area had the lower tension showing that a higher percentage of moisture was retained than on the uncontrolled area.

Red Desert Snow Study

Comparison of snow depth between the chemically controlled and the uncontrolled big-sagebrush areas showed no significant difference in the amount occurring at any period during the study. The snow cover was observed to be very even over the entire area except where occasional small clumps of tall sagebrush occurred. During the study, the controlled and uncontrolled areas were covered with an average depth of 7.7 inches of snow, containing 2.3 inches of water.

The various widths of controlled and uncontrolled strips had no influence upon the amount of snow held in them or in the strips to the windward side.

Big Horn Soil-moisture Studies

Moisture-retention studies of the Hyattville and Baldridge big-sagebrush experimental areas six years after the initial chemical treatment for control of big sagebrush indicated that a small difference in soil moisture existed between the 100 percent chemically controlled and the 0 percent controlled areas. However, when the factors of depth and date were disregarded, analyses showed no significant difference between the controlled and uncontrolled area even though the 100 percent controlled sagebrush area near Hyattville contained 18.2 percent more soil moisture than the untreated area, and the 100 percent controlled area at Baldridge contained 6.2 percent more soil moisture than the untreated area.

Soil-moisture percentages in the controlled and uncontrolled areas show that soil-moisture decline is not the same for the different dates and depths on these two areas. The uncontrolled area at Hyattville lost 33.6 percent more moisture than the controlled area from June 25 to July 30. The greatest loss of moisture during this period was at the 6-7 and 12-13-inch soil depths on the uncontrolled area. The moisture loss from July 30 to August 30 is just the reverse of this, the controlled area losing 26.0 percent more moisture than the uncontrolled area, largely because of a decrease from 17.9 to 8.9 percent moisture or a 50 percent loss in the amount of soil moisture at the 6-7-inch depth.

In the experimental area at Baldridge, there was only a slight difference in soil moisture at all soil depths in both the controlled and uncontrolled areas from June 25 to July 30. However, all soil depths

within both areas of control, showed a considerable loss from July 30 to August 30, except for the 18-19-inch soil depth in the controlled area, where the loss of soil moisture occurred at the 18-19-inch depth in July with very little loss of moisture in August.

Readings taken from the Bouyoucos blocks at the Hyattville location showed a significantly lower soil-moisture tension in the 100 percent controlled area. This difference was found mainly at 18-19 inches. This indicates that the controlled area contained a higher percentage of moisture than the uncontrolled area.

Data collected on July 9, 1959, using both soil samples and soil-moisture tension, showed no significant difference between the controlled and uncontrolled areas at both locations in the Big Horn Mountain study.

Big Horn Snow Study

Snow surveys made of the chemically controlled big-sagebrush plots over a four-year period, 1958 through 1961, in the Big Horn Mountains, an area where very little drifting of snow occurs, indicated that areas of 100 percent control retained snow later in the spring than areas of no control (Snow Survey table 1/).

SNOW SURVEY 1/

Year	Month	Unsprayed		Sprayed	
		Snow depth in inches	H_2O content in inches	Snow Depth in inches	H_2O content in inches
1958	April	6.7	2.5	23.6	6.9
1959	May	8.3	2.1	9.3	3.3
1960	March	10.11	2.8	17.8	5.1
1961	February	8.7	1.8	14.0	3.6
1961	March	9.9	2.9	17.7	5.4
1961	April	5.4	1.5	16.0	5.2

1/ Big Horn Mountain survey, elevation 8,200 ft.

On the uncontrolled areas the ground was frozen and covered with an ice sheet approximately two inches in thickness, but on the chemically controlled areas these conditions were absent, and the surface of the soil was found to be quite mellow. The soil surface immediately around live sagebrush plants was completely bare. This condition may be caused by the greater canopy of live sagebrush providing more evaporative areas as well as the "black body" radiator effect. The chemically controlled areas were observed to have a very even depth of snow with complete absence of bare areas (Figures 1 and 2).

Conclusions

1. Eighty to 100 percent sagebrush-control areas in the Red Desert experimental area, retained a significantly higher percentage of soil moisture one year after chemical control than uncontrolled areas.

2. Six years after chemical control, 100 percent control areas in the Big Horn Mountains contained a significantly higher percentage of soil moisture in late July than the uncontrolled areas.

3. Sagebrush control had no effect upon the snow-holding capacity in the Red Desert area in south-central Wyoming where drifting of snow usually occurs.

4. Controlled sagebrush areas in the Big Horn Mountain region retained snow longer in the spring of the year than uncontrolled areas.

5. The various-width sagebrush strips, in regions where drifting usually occurs, did not have a measurable effect upon the snow-holding capacity.

(Abstracted from WEEDS, Vol. 9, No. 1, January 1961.)

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Figure 1. UNSPRAYED SAGEBRUSH AREA

Figure 2. THE BACKGROUND IS A SPRAYED AREA WITH A UNIFORM COVERING OF SNOW. THE FOREGROUND AN UNSPRAYED AREA SHOWING THE ABSENCE OF SNOW AROUND THE LIVE SAGEBRUSH CLUMPS.

BETTER FENCE POSTS IN SIGHT FOR JOHN Q. PUBLIC
(Reprinted from WOOD PRESERVING NEWS
Vol. 39, No. 2 - February, 1961)

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About 40 years ago the United States Department of Commerce introduced an important program of national Commodity Standards designed to aid business and to promote general economic improvement. A short time later the scope of this activity was broadened to include the preparation of quality standards. The aim was and still is to make commodities more acceptable to the trade and to promote sound commercial practices in their manufacture, marketing and application.

Technical requirements of Commercial Standards define quality levels for products in accordance with the principal demands of the trade, and provide for close adherence to those qualities. The 235 standards include a broad variety of products ranging from chemicals, building materials to wood products.

During the last few years the general retail market has been flooded with millions of inferior wood fence posts. A large proportion of these were dipped or dunked in petroleum oils of various grades ranging from heavy crudes to crank case drainings with barely enough creosote added to provide a slight odor. Regardless

of the type, these oils are not toxic to fungi or insects and are practically worthless as wood preservatives.

In order effectively to combat such insidious practices and to assure buyers of receiving pressure treated posts with a potential service life of 30 years or more, the American Wood Preservers Institute approached the U. S. Department of Commerce and submitted a proposed industry standard. After several months of close work with users, treaters and distributors the Department developed U. S. Industry Standard CS235-61* for Pressure Treated Wood Fence Posts which became effective February 6, 1961. The new standard is presented elsewhere in this issue of WOOD PRESERVING NEWS. It is based on service tests conducted by the U. S. Forest Service in cooperation with the Wood Preserving industry and represents a consensus of users, manufacturers and distributors throughout the country.

Although its adoption and use are voluntary and no system of governmental regulation or control is involved, it may be used very effectively in conjunction with purchase orders and sales contracts. When the new standard is made part of a contract, compliance with

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* Commercial Standard CS235-61, Pressure Treated Wood Fence Posts (with oil-type preservatives) a recorded voluntary standard of the trade published by the U. S. Department of Commerce is for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 15 cents.

its requirements may be enforced either by the buyer or the seller along with other provisions of the contract. Buyers may order posts in compliance with the standard and determine for themselves whether the delivered posts meet those requirements. Manufacturers' references to CS235-61 in advertising, invoices or labels are an effective means of assuring buyers of compliance with the U. S. industry standard.

Such assurances of compliance will go far in promoting confidence between buyers and sellers and erase unpleasant memories of tricksters' products that resemble long-lasting pressure treated posts only in color and shape. The new standard provides the average user, retail lumberman, or farmer with a ready measuring stick for a quality product.

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Hard work is an accumulation of easy
things you did not do when you should have.

AN IRON POST DRIVER

(Adapted From a Suggestion by Lynn H. Kimball
Senior Forest Worker - Humboldt National Forest, Nevada)

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Materials

1. Three-inch iron water pipe 30 inches long.
2. Two 3/4" x 11" bolts threaded on one end.
3. Two 3/4" nuts for above bolts.
4. Two pieces of 3/4" rubber garden hose 8" long.
5. One piece heavy strap iron 1/4" thick, 4" wide and 12" long.

Design - See illustration.

The primary advantage of this post driver is the design of its handles. These handles are so designed as to let the hands slip free of the handles on ultrahard jolts, thus preventing the possibility of bruising or otherwise injuring the workman's hands. Discomfort to the hands often results when the handles are fastened to the shaft at their lower ends.

The rubber hose, which fits tightly to the handle, absorbs much of the shock when the driver plug strikes the post. It also adds friction to the handles so that extra downward force may be applied to the driver without hurting the hands.

Its weight (28 pounds) is such that one man can handle this driver effectively. Additional weight reduces the efficiency with

which the post driver can be used by either requiring two men for its operation or causing one man to overdo himself.

Its length (30") is designed for a man of about average height (5'11") driving 6-1/2' posts.

Three-inch pipe is more nearly the size of common steel posts and is in proportion to the post driver's weight and length.

Estimated cost:

Material	$3.00	
Labor	4.00	(includes blacksmithing and welding)
Total	$7.00	

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No train of thought is worthwhile unless it carries some freight.

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S A F E T Y M E S S A G E

ALERT TODAY - ON THE JOB TOMORROW

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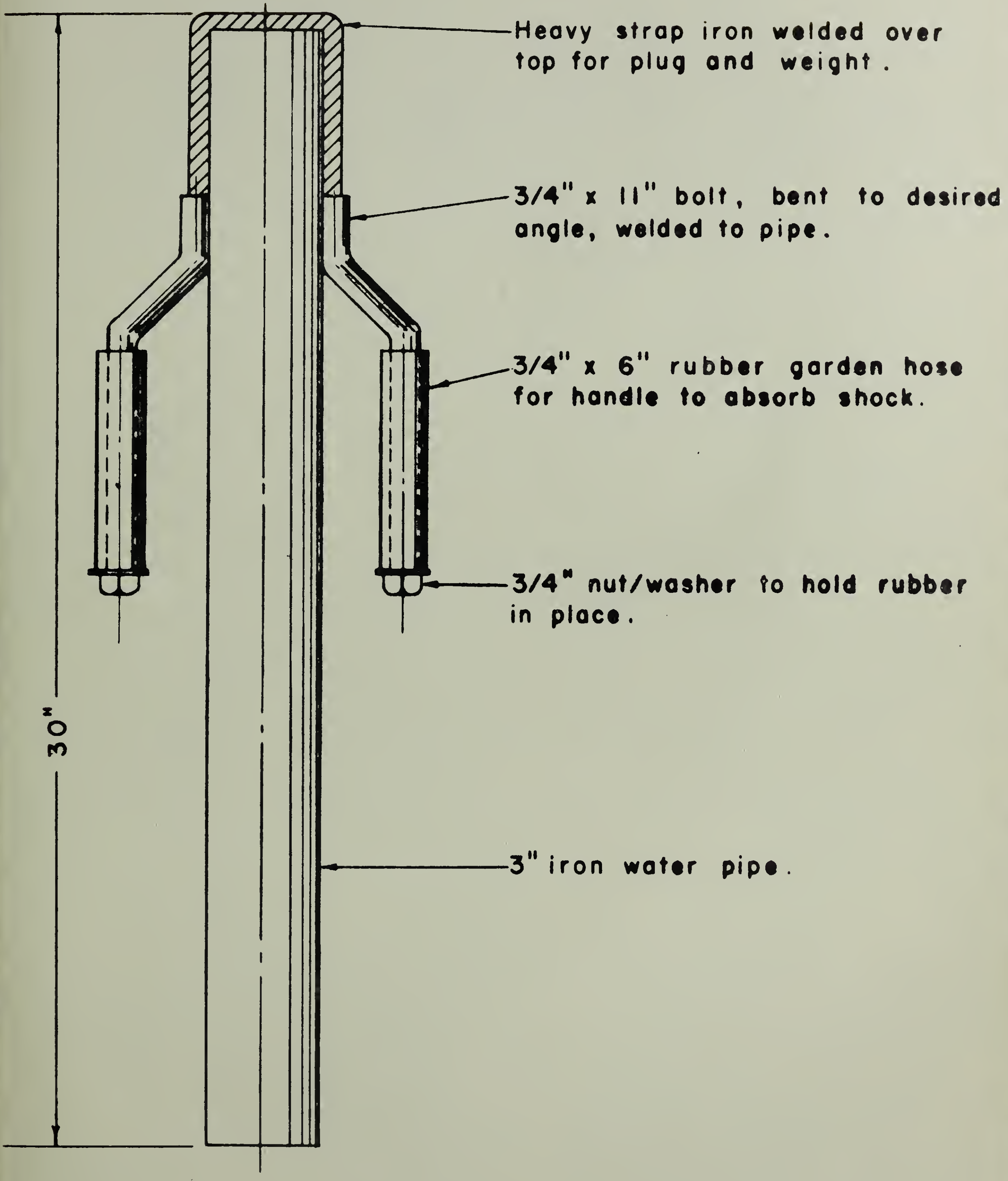
IRON POST DRIVER



Scale: 3" = 1'